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AGRICULTURAL RESEARCH.

Imperial Agricultural Research Conference.

WHEN the British Government earnestly took up the question of colonial development it was recognised that the encouragement of agriculture would be one of the things to be tackled as soon as possible. Historical reasons caused the establishment of the first important department in the West Indies and its good results were amongst the reasons that brought about a rapid extension of scientific agriculture in other colonies and in the Indian Empire. One has only to interpret the agricultural history of the British Tropics in the twentieth century to realise the value of their work. In many respects, however, there was room for improvement; a good deal of the scientific and general work of the energetic officers of the departments was lost or unrecognised because of its local nature and the non-existence of a central co-ordinating institution. Of late years much attention has been paid to agricultural organisation in all parts of the world and the recent Imperial Conference on Agricultural Research, the conception of which is attributed to Sir John Russell, was a recognition of its great importance in tropical developments. The Rt. Hon. Walter Guinness, the Minister of Agriculture, opened the Conference which had as its main objects the establishment of closer co-operation in agricultural research work throughout the Empire, the setting up of additional research stations in tropical and sub-tropical countries, the creation of Imperial bureaux, and the recruitment, training, and interchange of research workers. There were about 170 delegates including 70 from overseas, the following countries, in addition to Great Britain and Northern Ireland, being represented: Canada, Australia, New Zealand, South Africa, Irish Free State, Southern Rhodesia, India, Barbados, British Guiana, Ceylon, Cyprus, Gold Coast, Kenya, Leeward Islands, Malaya, Mauritius, Nigeria, Nyasaland, Palestine, Sierra Leone, Tanganyika, Trinidad, Grenada and Windward Islands, Uganda, Zanzibar and Sudan. The items on the agenda were so arranged that the plenary sessions during the opening week were devoted to the consideration of administrative questions. The task of considering the agricultural problems confronting the various parts of the Empire, for the solution of which the art of science must be involved was delegated to groups of specialists. This delegation is regarded by some as unfortunate although such

a method allows more work to be got through. At a first conference particularly, it is thought that general discussion on technical questions such as soils and fertilizers, plant pathology, preservation and transport of food and raw materials, animal and plant genetics, agricultural economics and dairying, would be time well spent. The delegates would have been able to grasp the magnitude of the responsibilities of the agricultural services and would have been able to envisage the inter-relations of the work already carried out in various constituent parts of the Empire.

After the London meetings the Conference moved on to the various research stations Cambridge, Edinburgh, Aberdeen and Belfast, later—a re-assembly for formal business in London intervening—visiting Rothamsted, the Imperial College of Plant Physiology Institute, Kew, and East Malling. Other stations could be visited at choice and we give some of them in order to show how much has been done in recent years to bring science into the service of agriculture—The Institute of Agricultural Parasitology, St. Albans; the Veterinary Laboratories, Weybridge; the Royal Horticultural Gardens, Wisley; the Long Ashton Fruit Research Station, Bristol; the Institute for Research in Dairying, Reading; the Welsh Plant Breeding Station, Aberystwyth; the Parasite Laboratory, Farnham Royal; and the Forest Products Research Laboratory at Princes Risborough.

Lord Bledisloe, who was elected chairman of the Conference said in his speech that it was eminently desirable that the British Empire should secure as its basis a self-contained supply of food and of industrial raw material not merely adequate for its needs but capable of sustaining its growing population. In order to effect this, the current production from the soil must be intensified; it must not merely be extended into new areas but must be augmented in the existing area of cultivation. Such intensification could only be accomplished by research and education, if the costs of production were not to rise inordinately and the so-called law of diminishing returns was not to operate adversely. Every Government required a corps of administrators and teachers—veterinarians, biologists, physicists and chemists—translating research into practice. That conference could not effect much as regarded actual research but it could survey the field and say what was needed in the way of primary institutes where fundamental work was being pursued. It would be worth while to discuss such questions as the establishment of further Imperial bureaux, the recruitment and interchange of workers, refresher courses for those working in the outlying parts of the Empire, and the organisation of occasional flying corps to attack special problems far away from the research centre. The Conference it was hoped would ensure fuller co-operation between staffs of all their institutes than had heretofore been possible and thus lead to considerable economics in time and money and a marked improvement in the efficiency of the work. This question of administration and organisation would be the prime concern of the deliberations of the Conference.

The discussions that arose on administrative questions relating to staffs and institutions were illuminating. It was stated that there is a serious shortage of suitable candidates for most branches of scientific services. The only satisfactory and permanent remedy for this state of affairs, suggested Lord Lovat, Parliamentary Secretary of State for the Dominions, was to make the Agricultural Research Services the equal of other Government Services in pay, status, career and rewards. The shortage is particularly acute in services for which a training in the biological sciences is a requirement and it was regarded as imperative that any general science course in the schools should include general biology as a subject and should not be confined, as it is in most schools in Great Britain, to physical and chemical science. The discussion on means of stimulating recruitment showed that the various post-graduate scholarships schemes in existence have been successful. The scholarships provided by the Government, tenable at the Imperial College of Tropical Agriculture at Trinidad, have already provided a number of officers for the colonial agricultural services in the Tropics. The scheme of the Empire Cotton Growing Corporation has also been successful in obtaining men for cotton research in various territories.

Our readers are already familiar with the main proposals for the establishment of research stations and the co-ordination of research. Major Elliott opened the discussion on this subject, and suggested that research stations should be few in number, at the outside, seven, and should consist of not fewer than eight members. They should also concentrate on the work at their own doors—in West Africa, for instance, attention should be given to problems connected with vegetable oils and fats. Referring to irrigation, he said that no real proposal had yet been brought forward for the establishment of a first class station working at the fundamental problems involved in the application of water to parched land.

The future of the conference was the subject of a memorandum and the motion of the Chairman for quinquennial conferences was seconded, although the matter was finally handed over to the Administration Commission. The general feeling was expressed by Lieut-Col. G. N. Williams (South Africa) who was in favour of pan-Empire conferences at intervals of not less than three or more than five years. At what periods conferences of research workers should be held to discuss the purely scientific aspects of their work was a matter for themselves. Regional conferences might be called together at such intervals as circumstances might justify. An appreciation of the work of the Empire Marketing Board was moved before the closing of the session.

COTTON IN FIJI.

The establishing of the Industry.

BY R. R. ANSON,
Cotton Specialist, Colony of Fiji.

FORTY-SEVEN years ago, Cotton was second only to the Copra Industry in Fiji, and the exported Lint and Seed was valued at £30,000 per annum. During this period many of the natives used to pay their taxes in Seed Cotton. Most of the Cotton was then produced from the dry zones of Vitilevu and Vanualevu Islands, Taveuni and Kadavu. A certain amount was at first grown in the wetter areas, but it was not found to be profitable and the growing of it in these areas was therefore practically given up. The varieties most favoured were Sea Island and Kidney Cottons, which the natives say used to grow extremely well on the sandy soils of the coastal areas.

Some Planters grew Cotton as a catch crop amongst Coconuts, and a few possessed their own ginning plant. Remains of these plants may still be seen at Lekutu on Vanualevu, and on the abandoned Government Experiment Stations at Nasinu and Natabau on Vitilevu Island.

After the American Civil War, there was a general slump in the Cotton market, and prices sank to such a level that Fiji Cotton had to be sold almost below the cost of production, with the inevitable result that various planters lost a considerable amount of money, and consequently from 1900 onwards very small quantities were exported. During 1906, experiments were recommenced at the Lautoka Experiment Station, but they came to nothing, and Cotton growing was looked upon as a thing of the past, until 1922 when the general shortage of raw material and attractive prices encouraged Planters to urge the Government to attempt a re-establishment of the industry. A small quantity of Sea Island seed was ordered from America. Fortunately, this consignment did not ever reach Fiji, as it was infested with Pink Boll worm and therefore condemned by the American authorities, and thrown overboard.

A further consignment of seed was ordered from selected Barbados Sea Island Cotton. This was distributed amongst 318 growers, of whom 290 actually planted, the average area being estimated at 1.9 acres and the yield per acre for the first year was approximately 232 lb. of Seed Cotton. The principal causes of so poor a yield were attributed to growers lack of experience, and planting instructions not having reached them in time, with a result that a large proportion of the crop was planted late and on unsuitable soil.

The following season was dry at its commencement with an abnormal rainfall throughout the Cotton growing zone of Vitilevu averaging 30 ins. during March, against an average of 9·20 ins. for this month taken over a period of twenty years. This did a good deal of damage, as it fell at a time when plants were about to reach maturity, but nevertheless, the industry showed signs of progression and the actual receipts were 184 bales compared with 101 on the previous season, and the average yield per acre rose to 424 lb. of Seed Cotton, and from 290 growers there was an increase to 529, good prices were realised and the best grades of Sea Island brought 37*d.* per lb.

On the 12th April, 1923, Mr. B. L. Field, who has had considerable experience in the ginning, grading and buying of Cotton in India, was appointed by the Government. Mr. Field lost no time, and by the 14th July had erected a small Ginnery (2 stand Platts single acting roller gins) presshouse, cotton store, and office at Lautoka.

At the instigation of Mr. Field, the Government requested the Empire Cotton Growing Corporation to send out a Cotton Expert, who might make a general survey reporting on all the possible Cotton producing areas in Fiji. This they did, and Col. G. Evans, who was at that time Director of Cotton Culture, Queensland, arrived in the Colony on the 11th July, 1924, and was conducted by the Acting Superintendent of Agriculture on a tour throughout the islands, which lasted from the 15th July until the 11th August. He was well impressed with the Cotton growing possibilities, and considered that the area under Cotton might in ten years be increased to 10,000 acres. He laid stress upon the need for concentration, and recommended the establishment of an Experiment Station near Lautoka or Nasarawaga. He also suggested that an additional Cotton expert be appointed in order that he might carry out plant breeding work on new and improved types, and that two itinerant demonstrators be trained by him.

The 1925-26 Season saw a reduction in the area from 585.5 acres in the previous year to 398.25 acres, and the average yield per acre was 378.011 of Seed Cotton. This was put down to the prolonged wet season, heavy rains continuing to fall until the end of May in the Ba, Lautoka and Nadi districts, whereas the districts of Nadroga and Colo West had a normal year, which proved most suitable to the cultivation of Cotton up the Sigatoka river. Generally speaking, there was, however, a marked improvement in the cultivation, and the crops looked a good deal better than those of the 1924-25 season, until the rains set in and took control, preventing the cultivator attending to his crop. The export for the year amounted to 190,243 lb. valued at £17,138.

Col. Evans' report culminated in the appointment of the writer, two Field Demonstrators, and the establishment of an Experiment Station at Nococo Levu on the Sigatoka River. During the 1926-27 season, the area under Cotton was greatly increased from 398.25 acres to 2,271, the distribution being as follows :—

Ra, Ba, Lautoka and Nadi	1,659	acres.
Sigatoka	612	do.
Total	2,271	do.

Seed Cotton was received from 1,759 growers, and it was found necessary to instal another gin at Lautoka, and to erect a Ginnery containing

4 Platts single acting roller gins at Sigatoka, in order to meet the large increase. Total receipts of Seed Cotton were 1,269,590 lb., which should yield approximately 910 bales, the estimated value of which is £31,500. The average yield per acre for the Colony was 559.0 lb. of Seed Cotton.

The area under cultivation could be considerably increased, and growers would plant more heavily if they had any assurance that the prices which have been realised during the past two or three years will be maintained in the future. No one, however, is able to give this assurance. The only variety of Cotton grown in Fiji is Sea Island, which realises high prices when the demand is good, but the market is unfortunately somewhat fickle and easily affected by changes in fashion. The question of replacing Sea Island by some other variety is one that is at present being given consideration, and several new varieties are being tested at the Experiment Station.

BELGIAN CONGO.

WHEN the Belgians arrived in 1880, Central Africa was full of warring and barbaric tribes. On the eastern frontier slave hunters flourished and it was not until 1895 that the occupation was completed. With relatively peaceful conditions, the cultivation of various tropical crops was introduced, but disappointment created an unfavourable attitude in Belgium and led to concentration on the import and export trade. Natural products—rubber, palm products, copra and ivory were shipped in increasing quantities, textiles and numerous other manufactured articles being received in exchange.

One of the greatest difficulties has been to induce the native to do work that he does not want to do, but which would be more profitable to him and others from an economic point of view. The African has few wants, little desire to work, regards his job as hunting, fishing, "palavering" and shows his contempt for agriculture by handing it over to the women, who also act as beasts of burden, look after the children, do the cooking, raise the crops, and market them.

On the basis of practice in the adjoining British and Portuguese colonies the Belgian Government in 1918 had small plots laid out to be worked by able-bodied men, arrangements being made for the marketing of the crops raised at a price that would show a profit to the native agriculturist. This plan, backed up by constant urging and instruction, has proved a success. Constant pressure is necessary. The fact that a crop is easy and profitable to grow does not induce spontaneous cultivation. In Northern Kantanga and in Kasai, for example, cotton is neglected for native food crops, because these are bought by the workers in the mines and in the railway; in Uélé, however, with no subsidiary sources of revenue, cotton is grown. Crops which take some time to mature are handicapped by the desire of the native for immediate returns.

Following successful practice elsewhere, an agricultural service was organised in 1910 to encourage the production of foodstuffs such as manioc, rice and bananas, and also the cultivation of export products. It was in the attempt to give substance to this object that the problem of native training cropped up.

The agricultural service includes within its jurisdiction the meteorological stations, the botanical gardens, the agricultural experimental stations and plantations, the veterinary service, the forest service, the laboratories for the study of plant diseases, insect pests and soils, the laboratory for veterinary bacteriology, game reserves, fisheries, and the flora and fauna reserves.

One of the most valuable of the native crops which has been encouraged is cotton.

To-day the Belgian Congo is equipped with 97 mechanical ginning plants, 60 of which are in the Uélé District. Erected by the cotton companies, these plants are linked up by main roads which are used by the motor lorries serving the ginneries, thus relieving the natives of the task of porterage and enabling them to extend their cotton plots.

Outstanding amongst other crops are rubber, coffee, palm oils and cocoa. The first *heveas* were imported into the Congo in 1896 and 1898 but only recently have results been encouraging. The total area now under rubber is about 12,500 acres and is increasing but slowly on account of difficulty in recruiting labour. Substantial progress, however, is being made in methods of cultivation and the organisation of the plantations, especially from the point of view of labour saving.

Although coffee grows wild in the Congo, early enterprises did not succeed, but the success attending the 1911 experiment of the Agricultural Department has brought about a multiplication of plantations which is only limited by labour shortage.

The largest industrial undertaking is the *Société des Huileries du Congo Belge*, founded in 1911 by William Hesketh Lever, afterwards Lord Leverhulme. At present it possesses six centres of production where large oil mills with the most modern equipment have been erected. It collects nuts wild or from its own plantations.

Cocoa has been grown chiefly in the Mayumbe district, but the rainfall in this region is not regular, and the crop is at present receiving far less attention than coffee and rubber.

At one time concessions were granted over large areas of vacant land suitable for farming and stockraising, but in recent years the Colonial Council has insisted on reductions in the area of concessions, and a system of long leases has been adopted by law in order to retain for the State the ownership of the conceded lands.

The shortage of labour, too, has necessitated a reduction in the number of new concessions, and it is the chief obstacle to progress in the cultivation of tropical products, the majority of which would find the climate and soil of the Belgian Congo favourable to their growth.

THE DETERIORATION OF SOILS.

BY F. HARDY.

Natural Soils.

NATURAL fertile soils, such as forest soils and prairie soils, differ from the rocks from which they were derived mainly in that they contain plant residues, and in that they teem with micro-organic life. Plant residues contain considerable amounts of inorganic salts (lime, potash, phosphate), derived originally from rock débris, and concentrated in the surface layers of the soil through the growth, death and decay of plants. Plant residues also yield a material usually called "humus," which is highly carbonaceous and highly nitrogenous. Humus provides a very suitable feeding ground for certain micro-organisms (the "nitrifiers") which convert its nitrogenous matter into nitrates and other simple nitrogen-compounds that can readily be absorbed by plants. Moreover, certain other micro-organisms (the "nitrogen-fixers") can actually maintain the nitrogen content of the soil by fixing atmospheric nitrogen in their bodies, and leaving it behind when they die. For successful growth, these beneficial micro-organisms require suitable conditions, such as adequate air supply, adequate water supply and absence of acidity in the soil. They derive much of their food material from the soil humus. Besides furnishing salts (lime, potash, phosphate), nitrogen compounds, and food material for useful micro-organisms, soil organic matter possesses very desirable mechanical properties which confer high water-retentivity and great ease of water movement on soil containing it. Hence, in general, soil fertility is directly proportional to the quantity of normal organic matter present in a soil.

When natural fertile soils are brought into cultivation by man, they at once begin to deteriorate. The removal of their covering of vegetation exposes the soils to rain, sun and wind. Erosion rapidly proceeds, especially if the land be sloping, and if no proper surface drains have been dug. The fertile top soil is partly washed away, and the accumulated salts are leached out. Sun and air encourage rapid loss of organic matter by oxidation, and the conditions of micro-organic life are profoundly disturbed. Eventually, a raw, lifeless, mineral remnant of the original soil, differing but little from the parent rock from which the soil was derived, is all that is left. This uncompromising material can no longer be described as soil.

Soil conservation.

The art and science of agriculture aim at preventing or counteracting these disastrous changes. It is good agricultural practice to prevent soil erosion; to minimize leaching or to make good its depletions by tillage and manuring; and above all to conserve soil organic matter or to maintain its store by returning all available residual organic matter to the land, and by burying cover crops deliberately grown for the purpose.

Soil robbing and soil building.

The policy of soil robbing has led to serious economic crises in many countries. Thus, Sir William Crookes at a British Association meeting in England in 1898, predicted a serious world famine in 1930, unless greater care were taken to lessen soil deterioration in wheat-growing countries. His warning directly led to the birth of the great atmospheric nitrogen industry, which nowadays produces thousands of tons of synthetic fertilizers yearly. It also led to greater attention being paid to the scientific aspects of agriculture. Nevertheless, in spite of conspicuous progress, once more warnings of overpopulation and impending food shortage are being sounded. Practically all the good agricultural land, available without expensive reclamation or developments in communication, is already in use, and the problem of soil productivity is nowadays even more serious than heretofore. It is gratifying to learn, however, that analyses of crop yield statistics in Europe and in America indicate that no general decline in production has occurred since good agriculture became the rule rather than the exception (See *Journ. Amer. Soc. Agronomy*, Feb. 1926). Most authorities are in agreement that even poor and low yielding soils can be built up into highly productive soils by diligent and continued attention to the well-established principles of modern agriculture. The constructive research of agricultural investigators, and the teachings of science, have undoubtedly exerted profound effects during the last half century, and have resulted, not only in soil maintenance, but also in actual increase of production of agricultural commodities per unit of land throughout the world.

Economic considerations.

Whilst the means to desirable ends are generally well known to present-day crop growers, their thorough application in any particular area is often a difficult matter, because of the restraint to activity furnished by fundamental economic conditions. The success of agricultural endeavour is gauged by the magnitude of the monetary profits. Nevertheless, economic conditions fluctuate enormously from period to period, and the successful crop-grower must be capable of adapting his practice to prevailing circumstances. For this reason, inertia and conservatism are fatal to agricultural progress, both individual and communal.

Mr. S. J. SAINT, Assistant Agricultural Chemist to the Government of Barbados, visited the College on 22nd October and stayed for ten days. During his stay at the College he collaborated with the scientific staff particularly on matters relating to the soil, and discussed problems of mutual interest. Visits of this sort are of great value, as not only do they permit scientific workers to get into personal touch, but they also tend to prevent duplication of work and unnecessary overlapping.

BRAZILIAN BANANAS.

By Algernon Aspinall.

Such great interest seems to have been aroused by the articles that have appeared recently in the *West India Committee Circular* on the subject of the importation of bananas from Brazil into England, that the writer is prompted to publish such information as he was able to obtain regarding the Brazilian banana industry during a recent visit to Santos, its present headquarters.

Santos is on the east coast of Brazil, just outside the tropics and about 200 miles south of Rio de Janeiro. It is the principal coffee port of the world, the port of the thriving state of Sao Paolo, and the gateway of the city of that name 50 miles away. Formerly a hot-bed of yellow fever. Santos is now comparatively healthy, and many Europeans are included in its population of 145,000 souls.

The cultivation of bananas is not a new industry in the neighbourhood. Attempts were made some years ago to cultivate the variety known as *Musa paradisiaca*, but they proved unsuccessful, as the trees, owing to their height, suffered from the north-west wind—a hot, dry wind to which the district of Santos is very subject. This variety is now practically extinct there, such small plantations as are still devoted to it providing only enough bananas for Santos and Sao Paolo. On the other hand, the *Musa Cavendishii*, or Canary banana, flourishes in the neighbourhood, and its cultivation is being encouraged by the "Centro dos Agricoltores de Santos." According to information supplied by the ex-President of that body there are no more lands available for the cultivation of bananas within a radius of 10 to 15 kilometres; but farther away extensive areas can be devoted to banana trees when problems of transport by water or rail have been solved.

Very few planters own the land. Most of them lease it—generally for a maximum period of ten years—the usual rent being two to six milreis—say 1*s*. to 3*s*. per month per "alequeire paulista" (about 6 acres). Even the large cultivators are tenants. The distance of the plantations from the port varies greatly. Some fortunate tenants are only from two to three kilometres away. Others, on the other hand, are as far distant as 40 kilometres from Santos.

At present, all the fruit is carried to the port in open barges; but in the plantations themselves its transport is effected by light railways.

Hitherto the principal market for Santos bananas has been Buenos Aires, and it would seem that every steamer sailing from that port carries a complement of that fruit either in the hold or stored on one of the well decks. During his stay in port the writer saw three vessels loaded in this manner. Open barges brought the fruit down the river and were moored against the steamers' sides. The fruit was then hoisted on board in nets, 20 to 30 bunches at a time. It was claimed that by this means 800 bunches could be loaded in an hour per hatch. At a berth a hundred yards or so below the one at which the writer's steamer was lying, the *Napier Star*, of the Blue Star Line, was taking bananas on board, being loaded in this manner; but it was stated that the dock company and Blue Star Line proposed to establish conveyors similar to those in use at Costa Rica, Colombia and elsewhere, to enable fruit to be shipped at the rate of 2,000 bunches per hour per hatch.

In this connection it may be noted that coffee is already loaded at Santos by conveyors which run from inside the immense warehouses to the ships' holds. The fruit is shipped "naked," whether it is destined for the Argentine or Europe, and it is stowed in cool and not cold space, ventilation being provided by fans.

The Argentine is the natural market for Brazilian bananas; but the demand in Buenos Aires is limited, many of the Argentines preferring oranges from Paraguay, and this circumstance has led to banana producers at Santos seeking a new outlet for their fruit. As readers of the *Circular* are aware, the first regular shipments of bananas to Europe were made this year by the steamers of the Blue Star Line under contract with the planters. Several earlier attempts proved abortive owing to the lack of persistent effort, and, it is claimed, the declaration of war against the shippers by a large American concern.

The contract price as far as one could learn is now $32,400, or roughly 16*s*. per dozen bunches at the present rate of exchange, and it must be borne in mind that the $, or milreis, is much debased, its present value being about 6*d*. as compared with the par value of 2*s*.

The impression one received at Santos was that both producers and the Blue Star Line were in earnest in their determination to establish a market for their bananas in Europe. The authority above referred to declared emphatically that the trade now inaugurated would never cease, though it would be necessary to resort to intensive cultivation to meet the new demand for fruit that has arisen. By the extensive use of fertilisers, abandoned lands could, he thought, be opened up and 7,000,000 bunches could be produced, of which 2,000,000 to 2,500,000 bunches could supply the Argentine, and the rest remain available for Europe.

Such is the information the writer was able to glean during a brief stay in the Port of Santos, and on the day after his return to England he was interested to see on a stall in the Market at Cambridge a poster inscribed "The Brazilian Bananas have arrived." The fruit below it appeared to be in very good condition and its flavour was prounonced excellent by his companion who tasted it. It certainly demonstrated that bananas of the Canary variety can after all travel "naked."—(*The West India Committee Circular*, Vol. XLII, p. 405.)

WEST INDIAN NOTES.

(*Concluded.*)

By SIR FRANCIS WATTS, K.C.M.G., D.Sc.
Principal Emeritus.

IT has already been said that the Imperial Department was called into being at a time when the prosperity of the sugar industry was very seriously threatened and attention was being earnestly directed towards the finding of new crops; the sugar industry was dying out in such places as Grenada, St. Vincent, Dominica, Montserrat, Nevis and others, which up to about this time had been to a considerable extent dependent on that industry.

In these circumstances attention was naturally drawn to the possibilities of cotton: this crop had been grown in the early days in several of the colonies, but like some other industries had given way to sugar. Cotton had also been grown in the West Indies on a considerable scale during the period of the American Civil War, when the cotton famine experienced in Lancashire caused prices to be extremely high, but with the fall of prices consequent on the cessation of the War, the industry was again abandoned. The memory of it lingered, however, and several suggestions were made to attempt its revival. One definite point in this movement may be referred to although there were others which were ancillary. In 1900 a plot of cotton of fair size was grown for demonstration purposes in the Experiment Station at St. Kitts, no commercial use appears to have been made of the crop but it attracted the attention of one of the leading sugar planters of the Presidency, and so impressed him that he at once planted a few acres in cotton to gain experience and to see whether it offered any prospect of being commercially profitable. About the same time the firm with which this planter was connected grew a small area in Montserrat with such promise that in the following year, 1902-3, about one hundred acres were put in with encouraging results. About the same time experimental plantings were undertaken in Barbados, St. Lucia, St. Vincent and elsewhere.

The Montserrat venture being encouraging, it seemed as if little remained for the planters to do but to obtain the necessary supplies of seed and to go ahead with the planting on a considerable scale. Accordingly, in the following year cotton was extensively planted, and soon the difficulties incidental to cotton growing in these islands began to make themselves evident. It was naturally thought that the kind of cotton most desirable for cultivation was the Sea Island variety, consequently this was the kind employed. These ventures attracted the attention of some of the leading users of Sea Island cotton and they manifested great interest in them; they used the cotton in their mills and tendered valuable criticisms and advice concerning the quality—its suitability for fine spinning, its defects and the manner in which it was thought that some of the defects might be overcome. The first lot of cotton was regarded favourably, though it had evident imperfections, but when the next lots grown from the seed of the former crop without any special selection—came into the hands of the spinners, it was found that the quality had seriously deteriorated and that the cotton was not at all acceptable for fine spinning.

The West Indian cotton grower was thus forced to realize that there are endless niceties in the characters of cotton and that only cotton having definite characters is in any way acceptable to the fine spinners. The grower was thus suddenly confronted with all the intricacies of seed selection and the inheritance of cotton characters of which he was then entirely ignorant, and it looked as though the ventures might have to be abandoned. To meet the situation, much activity was manifested on the part of departmental officers in order to learn what was then known about the selection and provision of suitable seed, such as had served to maintain the Sea Island cotton industry of Carolina, where the system of seed selection employed was giving good results. To assist in gaining the required information, the Commissioner of Agriculture went to Carolina and became acquainted with some of the principal growers of Sea Island cotton, studying the methods of seed selection on the spot and also securing a large supply of seed of fine quality. The situation was not free from some feeling of rivalry, for some growers of Sea Island cotton doubted the wisdom of furnishing possible rivals with supplies of their best seed, but after all they thought that the matter was not one of vast importance, for their experience had been that it is not possible to maintain the good characters of Sea Island cotton when grown away from the Sea Islands themselves. When the crop is grown inland, the seed had always been found to deteriorate and it was thought that any possible West Indian rival would always have to depend on supplies of seed derived from the Sea Islands, therefore the situation could always be controlled, if need be. I mention these facts to indicate the condition of knowledge at that time and the difficulties with which the pioneers were confronted. It is a mere truism to tell you now that the deterioration experienced was due to cross pollenation, and the comparative purity of the seed raised in the Sea Islands was due to a system of plant selection there in force, aided by the condition of natural quarantine arising from the fact that the industry was conducted on islands—this affording protection from the contamination that would arise from planting cotton in the general cotton bearing area on the mainland.

It was only about this time that the work of Mendel became known to West Indian workers and they were not slow to acquaint themselves with it and to recognise its possibilities in connection with the cotton industry. From that time onward there has been great activity in the West Indies in the matter of raising pure strains of Sea Island cotton of more than one type, and

in furnishing desirable kinds for cultivation. Incidentally I may add that soon after the events took place to which I have alluded, the Sea Islands were invaded by the Mexican Boll Weevil and their fine cotton industry destroyed. The West Indies are now the principal, if not the sole, repositories of Sea Island cotton, responsible for its maintenance as a valuable asset of the Empire. I may also add that it is this work which I have thus briefly outlined which culminated in the establishment of the Research Station of the Empire Cotton Growing Corporation here in Trinidad.

The troubles of the West Indian cotton growers did not end with the solution of the problem of seed supply: while trouble was manifesting itself in connection with the seed, various difficulties made themselves evident in other directions. As early as 1903 an entirely new pest manifested itself in the form of leaf-blister-mite, which caused distortion of the leaves and leafy structures, greatly damaging the crop, so that it was feared that the cultivation might have to be abandoned. This was an entirely new pest, neither the planters nor their advisers had previously seen it, so it was difficult to know what steps to recommend for its control. The scientific officers soon got to work and put themselves into communication with experts in other countries, and it was learned that the pest was a disease of cotton hitherto unknown and that information concerning it had to be gained *de novo*. This, however, was accomplished in time and planters were advised as to the steps to be taken to control it.

Other pests and diseases rapidly made their appearance, some of which threatened to put an end to the industry, as they undoubtedly would have done had there not been a body of workers established at the instance of the Imperial Department to investigate them and to advise concerning them as they made their appearance. It is interesting to note that many of these pests were entirely new so that the experience of cotton growers in other countries could not be drawn upon for guidance.

Prominent amongst the pests causing trouble at an early stage of the West Indian industry was the cotton worm (*Alabama argillacea*), with which West Indian planters were then unacquainted, though it was well known as a cotton pest elsewhere. Much study was devoted to methods for its control; these involved methods with which West Indian planters were unfamiliar and a good deal of work was required to organise the supplies of arsenical insecticides on which reliance was mainly placed, this organisation necessitating the active cooperation of planters, agricultural officers and governments in a way that was entirely novel. Not only were planters urged to keep adequate stocks of such arsenicals as Paris Green and London Purple, but the Agricultural Departments, backed by the Governments, themselves kept large stocks to supplement those of the planters and to safeguard the situation. These activities gave rise to a new outlook on the part of agricultural officers and at the same time served to link them more closely with their planter colleagues.

Observation led to the discovery of a useful ally in controlling cotton worms in the Jack Spaniard wasps, various species of Polistes, which use the cotton worm for feeding their larvae—an unexpected entomological alliance with which you are now quite familiar. There is little doubt that the abundance of these wasps in St. Vincent, encouraged to a considerable extent by the care with which they are fostered by the planters, accounts for the comparative freedom of St. Vincent from cotton worms and the consequent smaller use of Paris Green—though I understand that the St. Vincent planters have recently been caught short of Paris Green and have suffered in consequence.

I should like to refer to the cotton stainers (various species of Dysdercus), for they afford a good instance of new pests with which West Indian cotton planters had to contend and which they would have been quite unable to cope had it not been for the assistance given through the Imperial Department of Agriculture. The story is well known to you how the stainers carry the spores of certain fungi and introduce them into immature cotton bolls when perforating them to suck out the juices on which they feed. It is one of the signal successes of the Imperial Department that it unravelled the complicated story, though I may state that it took several years to do it. It was generally recognised that the stainer was an undesirable visitor to cotton bolls, but just what harm it did was not clear until it was suspected that these visits were in some way connected with the rotting of the lint inside the boll which was frequently observed to take place. It was commonly stated that the stainers discoloured the lint by their excrement and by being crushed in the process of ginning the cotton, neither statement being verified, though they still persist in the literature and, I am told, were prominently put forward in connection with an exhibit of cotton at the last Wembley Exhibition.

With the then limited resources at the disposal of investigators, it took several years to demonstrate clearly that the stainers carry the spores of species of Eremothecium and Nematospora, and introduce them when puncturing the cotton boll in feeding. The fungi concerned are singular in that they are only to be met with in fruits and seeds. Up to the time of these investigations they were entirely unknown in the West Indies, but are now known to be abundant in many fruits, from which they are introduced into the cotton bolls.

Having discovered how internal bollrot arises from the combined activities of the stainers and the fungi, the question of finding a remedy arose. This proved difficult. It was suggested that the first step should be to get rid of the stainers, but this was not easy, for, as Dysdercus feeds by sucking plant juices from below the surface it is impossible to poison it and it does not appear to be a prey to any natural enemy. The suggestion

was made to starve it out by having a close season when there should be no cotton plants on which it could feed, but it was soon found that it fed on quite a number of plants and so was capable of being carried over from season to season. The first plant to come under notice as serving to sustain the stainers was Thespesia, so efforts were made, notably in St. Vincent to destroy them all. When the Thespesias were partly dealt with it was found that certain forest trees, including Silk Cotton, *Eriodendron*, and Bois flot, *Ochroma lagopus* also furnished abundant food. It seemed almost hopeless to attempt to destroy these trees but the task was undertaken, and in the course of time, after considerable difficulty their numbers were so reduced that the stainers were substantially deprived of food and their numbers effectively reduced. It may be noted that the destruction of the Silk Cotton trees presented unusual difficulties; the trees themselves are large and hard to deal with, but what made the difficulties greater was the belief of many of the labourers that they are the abode of evil spirits and that harm will assuredly befall the person destroying them. This threatened to hold up the work, until it was discovered that it was reasonably safe if the cutting down were done by a left-handed man. Mr. Sands, the Agricultural Superintendent, was found to be a left-handed man—as a matter of fact, he is very ably ambidextrous—so he undertook to make the first attack on each tree, thus attracting to himself any danger that might arise, after which the felling went on without difficulty. It is perhaps worth remarking, however, that after the work of felling had gone on for some time a large tree fell upon and killed one of the ablest workers, thus, doubtless, to some extent confirming the feeling that these trees are not to be meddled with with impunity.

I think the story of the cotton stainer, which might be considerably amplified, amply illustrates the complexity of many agricultural problems and shows how agricultural officers having to deal with new problems, are frequently brought face to face with unexpected matters which require nimble brains and sound common sense as well as scientific knowledge to deal with. Work with the cotton stainer demonstrated in a clear manner how it is frequently necessary to interest all sorts of people in the elucidation of certain problems. In this instance there was the planter and his workpeople, scientific investigators of various kinds—agronomists, botanists, mycologists and entomologists—and also the Government, for legislation was necessary to enable some of the measures to be put into force. Useful lessons may be drawn from the manner in which it was found possible to get all these various interests to work harmoniously together, as was most admirably done as the work progressed.

It would be easy to give many other illustrations from the work of the Imperial Department to show how the officers working in connection with it were able to afford assistance and help to solve some, at least, of the many difficulties constantly arising in tropical agriculture and also to show how much of the information thus gained has proved of service to many tropical countries far from the West Indies. It was the recognition of the fact that the West Indies so readily served as a training ground where the main features of tropical agriculture can be demonstrated and investigated, that led to the extension of the activities of the Imperial Department into the Imperial College of Tropical Agriculture, an extension which I hope will be fully justified by results.

I have endeavoured to indicate how the West Indies have influenced Empire development and have in some degree affected certain trends of thought, and how, from an agricultural point of view, these have culminated in the creation of the Imperial College of Tropical Agriculture, which I have no doubt will in its turn exercise a still wider and more profound influence on the development of tropical agriculture, and, may I add, much of its success will depend on the energy, integrity and saneness of outlook of its students, who are about to spread widely over our tropical Empire carrying the lessons and precepts which have received their final rounding off at the College.

AGRICULTURAL FIELD DAYS.

IN connection with the scheme of training in tropical agriculture drawn up for Post Graduate students, excursions are being arranged throughout the year to government lands and private estates. These excursions which are being organised with the cordial co-operation of certain estate owners and managers and government officials, give students an opportunity of seeing the actual practice of agricultural operations in the tropics.

The programme for the first term of the present session is given below :—

Wednesday, 12th Oct.—St. Augustine Government Experimental Station.

Wednesday, 19th Oct.—Froghopper Day at Caroni Sugar Estate.

Wednesday, 26th Oct.—River Estate to see Cacao; Government Experiment Station.

Wednesday, 2nd Nov.—Visit to Government Stock Farm, St. Joseph.

Wednesday, 9th Nov.—Non Pariel Estate; Coconuts, Cacao, Rubber.

Wednesday, 16th Nov.—St. Clair Horticultural Experimental Station.

Wednesday, 23rd Nov.—Valsayn Coconut Estate.

Wednesday, 30th Nov.—Corporation Cotton Experiment Station (Dr. S. C. Harland).

Wednesday, 7th Dec.—Rice Fields in vicinity.

Wednesday, 14th Dec.—Visit to Government Forests (Arena Reserve) with Captain R. C. Marshall, Conservator of Forests.

Wednesday, 21st Dec.—To be arranged.

TROPICAL WORLD NOTES.

Peru.

The cinchona tree is a native of Peru, and at one time flourished in all the Amazonian regions, but spoliation and wanton destruction without any attempt at replacement have reduced the existence of this shrub to almost negligible proportions.

According to a report by H.M. Consul at Callao, no attempt has ever been made to cultivate the plant in Peru, and the bark is now only gathered in scattered quantities in the Province of Tumbes, and Sullana, in the extreme north of Peru, adjoining the Ecuadorian frontier, and to a very small extent in the Province of La Convencion, Cuzco, in Southern Peru. In 1925 the export of Peruvian bark amounted to 46 tons, valued at £P.4,260, which went to Germany and France. On the other hand, Peru is obliged every year to import large quantities of the drug, in manufactured form to combat the endemic plague of malaria from which half the population suffers. In the meantime Java has obtained control of the quinine producing trade, and exercises a virtual monopoly of the business. This situation has begun to alarm public health authorities throughout the world who realize the importance of a free market in this drug in the interests of malaria control, and at the Seventh Pan-American Sanitary Conference held in Washington in September, 1926, a resolution was passed recommending the resuscitation of the quinine industry in Ecuador and Peru.—(*Journal of the Royal Society of Arts*, Vol. LXXV, p. 1059.)

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India.

How the British hold the cholera situation in hand when ten million Hindus set out on a pilgrimage is one of the dramatic episodes revealed in a report just issued of the tenth extraordinary session of the health committee of the League of Nations. Approaches by rail and by road to the districts of Hardwar and Muttra where pilgrims by the million concentrate on the occasion of the Hardwar Fair were protected by inspection posts and first aid stations. Barbed wire entanglements barricaded ponds of stagnant water from the onslaughts of thirsty travellers. Safe supplies of drinking water were stationed along the route, while the river water at Bhimgoda temple where the pilgrims bathed was purified by chloride of lime. Cholera inocculation free of charge was provided for at hospitals along the way. The project of compulsory inocculation of all pilgrims for Asiatic cholera had to be abandoned as impractical on account of the vast numbers of individuals involved. As a result of these precautions only 38 cases were notified after the fair, according to the report. Of these 36 were imported from other provinces ; some as far away as Bengal and Assam.

Fiji.

The total trade of the Colony in 1926 amounted to £3,221,372, of which the value of imports was £1,480,945, and of exports £1,740,427, states the Fiji Annual Report for 1926. The value of imports exceeded that of 1925 by £209,810, but exports declined by £415,830. The main industries of the Colony are the production and export of sugar, copra and bananas. Of these commodities there were exported in 1926 the following quantities :—Sugar, 56,991 tons ; copra, 27,868 tons ; bananas, 564,397 bunches, of a value of £808,195, £573,475, and £138,040, respectively. As compared with the figures for 1925, sugar shows a falling off of 34,753 tons. This was due to unfavourable weather conditions during the middle of the year retarding the growth of cane. On the other hand, copra shows an increase of 3,735 tons, which was due partly to a carry-over from 1925, and to the fact that a number of additional coconut areas came into bearing during the year. The banana export trade is limited to New Zealand, and until further markets can be found no increase may be expected. Of the other items, those of interest are rubber and cotton. The majority of the rubber was exported to the United States, while the increase in the quantity of cotton exported was accounted for largely by a heavy carry-over of the 1925 crop.—(*The Board of Trade Journal*, Vol. CXIX, p. 413.)

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Ceylon.

The Ceylon press is discussing the question of opening a Ceylon House as an official trade agency in London for the purpose of advertising the island and furthering business prospects and interests. The main scheme is apparently that the organisation should be fathered by the Trade Committee of the Legislative Council and run on the lines of similar institutions maintained by other colonies. At the same time it must be admitted that the commercial side of the island is well looked after by an able and active Chamber of Commerce. Moreover, it is not likely that a Ceylon House on the lines suggested could influence any tourist trade from the United Kingdom, as India has more attractions for those with time and money to travel. There is also a very good Ceylon Association established in London which looks after the political and commercial interests of the island, and is better situated in this direction than an organisation working in a small and independent way could hope to be. The prominence the suggestion has received speaks well for the interest displayed in the welfare of Ceylon, but with the healthy surplus shown by the Budget each year it is hardly likely that any but lukewarm interest will be taken in official quarters.—(*The Manchester Guardian Commercial*, Vol. XV, p. 448.)

Brunei.

The annual report on the State of Brunei for the year 1926 (No. 1341), shows that the trade of Brunei during 1926 was valued at approximately $3,276,583, as against $2,873,154 in 1925, of which imports were responsible for $1,625,535 ($1,013,418), and exports for $1,651,048 ($1,859,736). Amongst the imports, the chief items were as follows, the figures for 1925 being in parentheses :—Rice, $273,649 ($242,811) ; machinery, $266,071 ($276,862) ; provisions, $123,488 ($66,678) ; tobacco $119,445 ($99,416) ; dyed cotton goods, $116,627 ($151,275) ; sugar, $60,506 ($50,505) ; and petroleum, $45,206 ($35,583). There was a large decrease in the quantity and value of cutch exported, due to difficulty in securing adequate labour to maintain regular supplies of raw material, while the exports of sago flour and raw sago dropped heavily owing to the much more lucrative and easier work of jelutong tapping. The leading items of export were :—Plantation rubber, $1,032,055 ($1,318,218) ; jelutong rubber, $295,978 ($174,288) ; cutch, $189,200 ($234,000) ; and dried prawns, $52,763 ($38,577).

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Nigeria.

The combined import and export trade of Nigeria last year amounted to £30,573,000, which was a decrease of approximately £2,500,000 on the trade of 1925, and was made up of imports to the value of £13,287,000 and exports worth £17,286,000. The value of transit trade amounted to about £20,000, a drop of over £56,000.

Details published in the latest Colonial Report on Nigeria No. 1335, H. M. Stationery Office, Kingsway, London, W.C.2, price 1*s.* 3*d.* net show that commercial imports, excluding specie, were valued at £12,456,000, a decrease of more than 7 per cent. as compared with 1925 ; while commercial exports at £16,888,000 showed a slight increase. The United Kingdom accounted for 53.7 per cent. of the total trade, as against 65 per cent. in the previous year, imports at 60 per cent. showing a decline of 14 per cent., and exports at 47 per cent. being 9 per cent. less. The trade of the United States slightly decreased to 6.5 per cent., and that of Germany rose by over 3 per cent. to 14 per cent.

Exports of palm oil, at approximately 113,000 tons, were below the figures for 1925 and 1924 ; shipments of palm kernels amounted to over 248,000 tons ; and cocoa exports at over 39,000 tons were greater than any year except 1925. Ground-nuts, cotton lint, and tin ore were other important products figuring in the export trade. Ground-nuts shipped in 1926 totalled over 115,000 tons and for the first time in the history of the colony these exports exceeded those of palm oil. Exports of cotton lint rose by more than 46,000 cwt. to the record total of over 179,000 cwt., and the quantity of tin ore shipped also reached the record figure of 10,558 tons, or more than 1,000 tons above the best previous record.

With the exception of a soap factory at Apapa, there are no manufactures in Nigeria on a commercial scale. Earthenware and brassware are made for local use and for sale as curios. Leather is worked, and a certain amount of cloth is woven.—(*The Chamber of Commerce Journal*, Vol. LIV, p. 170).

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Mauritius.

Interest in tobacco continues to be well maintained, there are now about 2,000 acres under cultivation in this crop, and 32 flue curing barns have been erected. In anticipation of the imposition of an excise duty, Chinese manufacturers have been buying leaf at very high prices with little regard to quality. The effect of this is bound to be unfavourable in the long run. The Government Grading Factory came into operation during the month, but very little tobacco is at present coming forward for export, mainly owing to the circumstances stated above. A movement has been started for a Tobacco Growers' Association. The British American Tobacco Company has just completed arrangements for producing an all Mauritius tabacco cigarette to be sold under the name of Jockey. The baling and grading factory of the Hemp Producers' Syndicate was completed by the end of June last, unfortunately operations have not yet commenced owing to unexpected difficulties connected with the supply of electric current from the Municipality of Port Louis. Prices for Fruit canning and preserving have been Rs. 320 and 270 per ton. Discussions have been continued with a view to the launching of a project for the growing and canning of pineapples. The report of Mr. C. A. O'Connor, Chief Agricultural Officer of the Department of Agriculture, on his official visit of inspection to South Africa in March-May last has been received and is being considered.

H. A. T.

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French West Africa.

A measure, superficially of a restrictive character, but aiming at conservation of rubber supplies in the long run, has just been introduced in French West Africa. All tapping of any kind of rubber tree or vine is to be suspended for a minimum of three months each year, it being within the power of Lieutenant-Governors acting in Council to settle for each Colony the time of the year during which such prohibition shall be effective, or to divide the whole period into shorter periods at different times of the year. So long ago as 1912 there was a decree enforcing a maximum (not minimum) rest of three months for the trees, but from the first it was a dead letter. The need for making the prohibition really effective is evidently recognised in official quarters, but it remains to be seen whether they will be as powerless as before to control tapping.—(*The India-Rubber Journal*, Vol. LXXIV, p. 2.)

COTTON IN AFRICA.

COTTON GROWING IN SOUTHERN AFRICA AND THE RHODESIAS.—Report on a tour undertaken by the Director, Empire Cotton Growing Corporation. London, price 2s. post free.

The energy of the Empire Cotton Growing Corporation and their evident intention to leave no stone unturned, in their desire to serve the interests of their constituents, by exploring thoroughly every possibility of growing cotton of the sort that Lancashire wants, is well exemplified by a tour which was recently undertaken by a deputation consisting of Sir James Currie, the Director of the Corporation, Mr. J. S. Addison, formerly Vice-Chairman of the Executive Committee, and Mr. H. C. Jefferys, who has considerable experience of cotton growing in Egypt and the Sudan, to South Africa, to report on the progress that was being made by the Corporation's staff in the Union, Swaziland, and Rhodesia and the prospects of cotton growing generally in those areas. The result of this tour of inspection has been the production of a very readable and well illustrated Report, which details the itinerary of the party, and after giving their general conclusions, tabulates their recommendations for the further prosecution of the work.

It may not be out of place to remind our readers that the attention of the Empire Cotton Growing Corporation has been attracted to the possibilities of cotton growing in South Africa from the time of its formation. After receiving a report on the general situation from one of their own staff, Mr. Milligan as general officer in charge, and Mr. Parnell as Cotton Breeder, arrived in the country about the middle of 1924, while subsequently, specialists were sent to Swaziland, Natal, and Northern and Southern Rhodesia. All these officers were visited in the areas in which they are at work by the deputation in a comprehensive tour which lasted for three months, and necessitated their travelling from Cape Town as far north as Mazabuka in Northern Rhodesia, only sixteen degrees south of the Equator.

The report well describes the difficulties which have hindered the production of cotton in South Africa, and shows how the cultivation of this crop on a large scale has been jeopardised primarily by insect pests of different kinds, and further delayed by the adoption of unsuitable financial methods. The cause of the latter is due here, as elsewhere, to the boom in the price of cotton in 1924, which came in South Africa after one or two favourable seasons, and resulted in a number of undertakings coming into existence, unduly heavily capitalised, and with but poor prospects when seasons and prices became more normal. Insect troubles are many: the Jassid (*Empoasca fascialis*), especially in the middle and low velds—from about 3,000 feet to sea level—was found to be responsible for very heavy damage; the Sudan Bollworm (*Diparopsis castanea*) was plentiful and universal, while much loss was caused by stained cotton, the cause of which was mostly Internal Bollrot, carried by stainers. The combination of the first two was particularly serious, for if the Bollworm took the early crop, the Jassid could usually be relied on to ensure that there would be no late crop.

Investigations quickly showed the existence of plants which possessed considerable power of resistance to Jassid, and indicated the possibility of raising Jassid-proof strains, and the statements made in this Report, with the photographs attached, afford conclusive evidence of the success which has attended this line of work at Barberton. The writer was privileged to see some of Mr. Parnell's plots at this station, and anything more definite than the superiority of the resistant strains cannot well be imagined. It is true that similar progress has not yet been obtained at Gatooma in Southern Rhodesia, and other workers on this crop, it is known, hold the view that Jassid damage is, at root, a deficiency disease, to be met by manurial treatment, but the success at Barberton and all through the low veld where the strains have been tested has proved beyond doubt, the wonderful success of this line of attack.(1) It is very satisfactory also to learn that this property of resistance has been obtained without any loss in quality for the lint from such of the strains as has been sent for testing in England, has received excellent reports. Considerable progress has already been made in the multiplication and distribution of the most advanced of these strains to the public, and one learns with pleasure that the deputation have recommended that the Barberton Station should be reasonably equipped and the staff augmented.

Information as to the habits and life history of the *Diparopsis* is still scanty: it is for instance only within the last year or so that it has been found definitely feeding and breeding on a wild host plant, while much has still to be learnt about its method of "carrying over" and the factors governing its emergence. Experiments in collecting "flared" squares from the young plants, and in catching the moths are described. The practice of leaving a small portion of cotton as a ratoon to serve as a "trap" crop is also noted, and is actually part of the routine on two cotton-growing estates.

It was perhaps as well that the Committee struck a particularly dry season, for not only did they run less risk of being unduly optimistic as regards the normal yields to be expected from this crop, but they were able to see the value of cotton as a drought-resisting rotation crop, producing something when everything else was a complete failure. The drought had, of course, played havoc with much of the experimental work, and in Swaziland and Natal, mention is again and again made of the failure to obtain useful results from the plots, or from the introduction of new crops, for the need of further study of rotations which shall include cotton, along with other crops, is receiving special attention at the hands of Mr. Parsons in Natal.

Jassid and Bollrot in Southern Rhodesia spoilt the crop, and most growers are reported to have suffered a loss, though farmers are convinced that it is by far the best rotation crop for maize, providing not only the lint, but useful grazing for stock after the crop has been picked, and seed which can be used for concentrated rations or to mix with phosphates as a manure for tobacco. In Northern Rhodesia work has scarcely begun, although it is refreshing to read of the 27,000 acres that have been set aside for a new combined Experimental, Agricultural and Veterinary Station at Mazabuka.

Note is also made of the Government scheme of cotton grading. Established by law, before the cotton trade was very old, and before vested interests had become rooted, it functions very satisfactorily, and guarantees that every bale of cotton that leaves British South Africa, can be sold on its marks.

In general the Report is optimistic. It places more hope for the expansion of the cotton growing area in the small grower than in the large capitalistic company, though the latter have their value in opening up new areas. The deputation emphasised that expansion will be slow, but that in view of the very large areas available, and the number of settlers, the area under cotton will become considerable. It recommends highly that the work already initiated should be carried on and developed.

A word of praise may be given to the photographs; one of them, that depicting a crop of U-4, is exceptionally good.

1. For further information *see* Empire Cotton Growing Corporation Reports from Experiment Stations 1925–26.

AGRICULTURAL EXCURSIONS.

IN pursuance of the scheme arranged for this term, of devoting Wednesday each week to an outside excursion, under the guidance of the Professor of Agriculture, to some place of interest, a full muster assembled on Wednesday morning, 12th October, for a visit to the St. Augustine Experiment Station. As this was for most of the party, their first experience of field work in the Tropics, the pace was a leisurely one, but in the course of the morning, the two groups into which the party split, saw most of what was going on, and made the acquaintance of quite a number of new products, among which, it was noted, the coconut, and its milky contents, was by no means the least appreciated! Our thanks are due to Mr. Brunton for showing us round and answering the numerous questions which were put to him.

The excursion on the 19th was to the Caroni Sugar Estate, and on this occasion the Principal and Professor Hardy accompanied us, the latter being kind enough to explain to us some of the Froghopper work on which his committee are busy. We were met at the Factory by Mr. Grant, the manager, who had thoughtfully arranged for our transport in trucks, along the estate line to the field where operations were in progress, a method of transport, which, if somewhat grimy, had the merit of novelty to most of us. Halts were made at various places to see the work that was in progress, and the morning ended with a visit to the cattle sheds to learn something of the conditions in which pen-manure is made. We are much indebted to Mr. Grant for the arrangements he made for our visit, and the information he gave so freely to his many interrogators.

On the 26th, we went further afield, for, accompanied by the Principal and Professor Cheesman, the whole party was transported to the River Estate, where we were given an opportunity of seeing something of the comprehensive Experimental Programme which the Local Department of Agriculture is carrying on there. Mr. Urich and Mr. O'Connor had been to very great pains in ensuring that the visit should be a success, even providing the party with copies of a map of the estate and a statement showing the yield of many of the plots for the past two years. A most interesting morning was spent, the pleasure of which was only slightly damped by a heavy shower of rain which caught the party just as it was returning to the excellent lunch which our hosts had provided. The afternoon was given up to learning something of the manufacturing side of cocoa production, after which some of the party enjoyed a bath in the Blue Basin. A truly splendid outing, and we are very grateful to those who so kindly engineered it: Mr. Urich, Mr. O'Connor, and Mr. Seheult.

The excursion on Wednesday, 9th November, was to see Mr. E. A. Robinson's Non Pareil Estate, beyond Sangre Grande, and very interesting it proved to be, for we saw rubber, cocoa and coconuts. The former was a novelty to many of the party who were much attracted by the methods of tapping, and the simple yet efficient chemical control exercised in the preparation of the sheet rubber, as explained most interestingly by Mr. Ferguson, the estate Manager, who had gone to a good deal of trouble to make our visit a success. The mycologically and entomologically inclined saw much to interest them, and though they came home metaphorically laden with specimens, we understand that the exact cause of the Brown Bast disease still remains unknown. After lunch, while one portion of the party went round the rubber factory, the other watched the extraction of copra, and the method of drying it on covered floors. The Red Ring disease of Palms and the Cocoa Beetle were both seen and studied in some detail, for we were fortunate in having Mr. Urich with us to explain things.

CHEMICAL NOTES.

Compiled by the College Department of Chemistry and Soil Science.

Progress in the Chemistry of Plant Products.

The following notes are taken from an article entitled "A Year's Progress in Chemistry," by D. H. Killeffer, which appeared in the American journal, *Industrial and Engineering Chemistry*, October, 1927, pp. 1077-1082.

(1) RUBBER.—Rubber growing in Liberia under American control, is developing rapidly. The plantations contain more than 200,000 mature trees, which yield monthly some 100,000 lb. of rubber. A suggestion has been made that plantations in Tropical America should next be established by funds raised from a consumers' voluntary tax. Research on the production of synthetic rubber from petroleum derivatives has proceeded rapidly. The use of rubber latex for strengthening paper, first suggested in Britain, has been found to be uneconomic, but large-scale trials in the United States are proceeding with hope of greater success. Electro-plating goods with rubber from a bath of latex or rubber emulsions is being developed at Akron, Ohio, by the American Anode Company which is part of a large combine formed by the Eastman Kodak Co., the Goodrich Rubber Co., and the Anode Rubber Co., of Great Britain. Definite information regarding progress is rather meagre.

(2) LIQUID FUELS FROM COAL.—Hydrogenation of coal to produce liquid fuels resembling petroleum (Bergius Process), received commercial application in Germany American rights to this process have been acquired by the Standard Oil Company of New Jersey.

(3) FIXATION OF ATMOSPHERIC NITROGEN.—The ammonia synthesis process has reached a point in the United States where it is a cheaper source of nitrogen than Chile nitrate. An important feature in the year's progress is the application of a method for removing impurities of carbon monoxide and carbon dioxide from the watergas used in making synthetic ammonia. The impurities are caused to combine with hydrogen to form methyl alcohol which is a valuable solvent.

(4) UTILIZATION OF CELLULOSE WASTE.—The Austrian Dorner Process for manufacturing cellulose from waste corn (maize) stalks has been introduced into the United States, with a view to furnishing a cheap source of artificial silk (rayon). Reports are highly optimistic, but not universally so. The Mason process for manufacturing fibrous cellulose from saw-mill waste, promises well. The waste is subjected to steam pressure of 1,000 lb. per square inch. The pressure is then suddendly removed. By this means, the material is blown up into separate fibres which find use in the manufacture of pressed boards.

Effect of Ethylene on Composition of Fruits.

In continuation of researches on the forced colouring of citrus fruits by ethylene (*see Trop. Agric.* Vol. II, 1925, p. 38), it is interesting to note the results of further investigations into this matter. Some of these are described in *Industrial and Engineering Chemistry* for October, 1927, at pp. 1135-1139. In 1922-23, Dr. F. E. Denny, of the U.S. Bureau of Chemistry's Fruit Laboratory at Los Angeles, proved that ethylene could be employed to effect the forced colouring of oranges and lemons. Since then, the treatment has been applied to bananas, tomatoes, persimmons, pomegranates, avocado pears and dates. In addition, chemical analyses have been made of various fruits (especially citrus fruits), both treated and untreated, in order to trace any changes in composition which the treatment may have produced. Careful determinations of the contents of moisture, pentosans, reducing sugars, sucrose, fruit acids, and total soluble solids, were made. The data thus obtained prove (1) that there is *no* change in the composition of the edible portion of *citrus fruits* as a result of ethylene treatment; (2) that the slight changes produced in dates are no more than those changes that are produced by heat alone; (3) that the astringency of persimmons is destroyed by ethylene; (4) that the colouring of bananas, tomatoes and persimmons is more or less accelerated by ethylene; and (5) that the colouring of pomegranates, avocado pears and dates is not much affected by ethylene treatment. Because some of the results so far obtained are not satisfactory, further trials are being made.

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Wood Preservatives.

It is known that wood-rotting fungi, such as various species of *Fomes*, thrive in acid media. During their growth, a weak acid appears to be produced. This may confer a reaction of pH value 5·0 on the medium in which the fungi are developing. These facts suggest that the use of alkaline substances should prevent wood rot. Experiments were accordingly conducted from this view point by Dr. L. F. Curtin, of the Western Union Telegraph Co. of New York. The results are presented in an article in *Indus. Engin. Chem.*, October, 1927, p. 1159. Amongst the various alkaline substances tried, were sodium carbonate (washing soda), and the carbonates of the alkaline earth metals (calcium, barium and strontium). Certain of these compounds are used in proprietary wood-preserving mixtures. Comparative tests showed that barium carbonate appears to be of especial value, because it is not only highly toxic to wood-rotting fungi, but it is also non-corrosive, stable, and electrically non-conductive.

SOIL SCIENCE.

First International Congress, 1927.

ARISING out of numerous conferences held in Europe by prominent workers in soil science during the past eighteen years, the First International Congress of Soil Science met in Washington, United States of America, on 13th June, 1927. On the authority of President Coolidge, the United States Department of Agriculture had invited foreign governments to send delegates to the Congress. Less formal invitations had also been sent by the American Organizing Committee to heads of agricultural departments of almost every country in the world. When the Congress assembled, some four hundred soil scientists, representing thirty different countries, were welcomed by President Coolidge, and by the Secretary of Agriculture, Mr. Jardine. Under the presidency of Dr. Jacob G. Lipman, head of the New Jersey Agricultural Experiment Station, the Congress met daily from 13th June to 22nd June at the United States Chamber of Commerce Building in Washington. Here a great number of papers were read at meetings representing different sections of agricultural science, and discussions of topics such as soil classification, soil mapping, soil examination and laboratory technique, were held almost daily. A very instructive exhibit of apparatus, models, pictures and soil specimens, formed a valuable adjunct to the meetings. In addition, several addresses by prominent men were delivered on general topics, and a few excursions to districts, agricultural colleges and fertilizer factories in the neighbourhood of Washington were made.

On 22nd June, some two hundred and fifty delegates, including many Americans, embarked on a special train for a trans-continental trip which lasted thirty days. The itinerary had been arranged so that delegates could be given an opportunity of studying the great soil regions of the United States and Canada, as well as the main cropping areas, agricultural colleges and experiment stations, agricultural business organizations, and places of general interest. Dr. C. F. Marbut, Chief of the United States Bureau of Soils, acted as guide on the tour; Dr. Oswald Schreiner, as Chairman of the Organizing Committee, and Dr. A. G. McCall as Secretary.

The itinerary included Greensboro (North Carolina), Knoxville (Tennessee), Atlanta and Athens (Georgia), Aurora and Carthage (Missouri), Kansas City (Kansas), Canon City (Colorado), Salt Lake City (Utah), Riverside, Los Angeles, San Francisco and Berkeley (California), Corvallis and Portland (Oregon), Seattle (Washington), Vancouver (British Columbia), Edmonton (Alberta), Saskatoon and Indian Head (Saskatchewan), Brandon and Winnipeg (Manitoba), Fargo (North Dakota), St. Paul and Minneapolis (Minnesota), Nevada and Des Moines (Iowa), Moline and Chicago (Illinois), Lafayette (Indiana), Washington, and New York City, where the tour ended on 22nd July.

In the Southern States, the great cotton belt, the Mississippi flooded river lands, and the peach country were traversed. In the Middle Western States, the corn belt of the prairies, and the irrigated lands east of the Rocky Mountains, as well as those of the Great Salt Lake basin, were seen. In the far south-west, the irrigated citrus region near Riverside, and the alkali plains of Nevada and California were inspected. In the north-west, the dairying and fruit-growing industries were studied, and the great pine forests of British Columbia were viewed. In central Canada, the wheat lands of the prairies were crossed, and in Iowa the highly fertile black lands growing wheat and corn were examined.

The places of interest that were visited included the Royal Gorge through the Rockies, Pike's Peak (14,000 feet above sea level), Salt Lake, the Mormon Temple, the Mojave Desert, the Trona Potash Mine, the Great University of California at Berkeley, Jaspar Park in the Canadian Rockies, the Thousand Lakes at Minneapolis, Deere's Plough Works at Moline, Swift's Stock Yards and Meat Factory, the International Harvester Company's Factory and the University buildings at Chicago.

During the tour, the foreign delegates were the guests of the American Organizing Committee, who had obtained, thanks chiefly to the efforts of Dr. Lipman, some seventy-five thousand dollars in donations from various sources to meet the costs of the Congress and of the tour. At the various places visited, local organizations, such as chambers of commerce, generously provided fleets of motor cars that conveyed the party to sites where soil sections had been prepared, or took them over long distances to inspect systems of cropping. It was everywhere evident from speeches of welcome and the comments of farmers, that the greatest interest was shown in the objects of the Congress, and that the work of the United States Federal and State agricultural services were highly appreciated by rural and urban populations alike.

At the last meeting in Washington, Dr. K. Glinka of Leningrad was elected president of the next congress which was provisionally arranged to be held in Russia in 1930.

F. H.

WE have received an illustrated pamphlet from the Dominions Potash Supply Co., 41, Eastcheap, London, E.C.3, indicating the advantages of the application of potash to coconut palms. The pictures and figures show that potash improves the vigour and health of the trees and increases the number and size of the nuts. The full effect is not generally apparent until the third year, although an increase in the crop is often obtained in the second year. Leaflets and technical information on the manuring of crops can be obtained gratis from the Agricultural Adviser of the Company at the address given above.

SUGAR NOTES.

Compiled by the College Department of Sugar Technology.

Factory operation of Automatic Electrometric pH control of Cane Juice Defecation.

In a paper presented before the Division of Sugar Chemistry, American Chemical Society, R. T. Balch and H. S. Paine describe the automatic control of the liming of cane juice in the manufacture of raw sugar which was tested over a period of four months in a Porto Rican central. The results indicate a very promising means of controlling this important process. The equipment consisted of (1) a recording potentiometer fitted with a controller time switch which, through relays, caused the motor of the liming device to operate in the required direction at definite intervals; (2) tungsten and calomel electrodes fitted in a continuous flow juice chamber; (3) a temperature compensator; and (4) a tilting weir-box for the liming device.

A continuous sample of limed juice taken from a by-pass on the bleeder line from the juice pump was passed through the juice chamber over the tungsten electrode. The electromotive force (each value of which corresponds to a definite pH of the juice) between the tungsten and calomel electrodes is measured by the potentiometer and the values traced upon a chart. At definite intervals the control switch is closed and an adjustment in the quantity of lime being delivered is made according to the deviation of the recorder tracing from the control point (the pH value to which it is desired to lime the juice). A 15-18° Be. lime suspension was delivered to the weir-box under constant pressure and finely screened. The lime was added to the juice in the canal connecting the mill juice strainer and pump supply tank. A stirrer in the canal produced intimate mixing of juice and lime. No provision was available to equalise the rate of flow of the juice at the point of addition of the lime and this contributed largely to the failure to obtain a close control at all times. This can, however, be corrected in future installations.

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Crystallization of Sucrose Solutions.

The effect of colloids on the velocity of crystallization of sucrose has been studied by J. Deber and J. Novacek (*Kolloid Z.* 42, 1927, pp. 163-167). A method for measuring "crystallizability" is given as follows:—

Solutions containing 66 per cent. by weight of sucrose are poured into uniform crystallizing dishes which are placed in desiccators over calcium chloride at 20° C. If carefully prepared the solutions do not crystallize. To promote crystallization, the desiccators are opened for a moment and sucrose dust is blown in. In a given time pure sucrose solutions deposit a comparatively small number of large crystals, whereas solutions of low purity or pure solutions to which colloids from sugar factory products have been added deposit a large number of small crystals. The weight of sucrose crystallized from the pure solutions is greater than that from the impure solutions. Parallel experiments agreed within 2 per cent. The authors attribute the higher crystallizability of pure solutions partly to the higher supersaturation in the surface layer with which the sucrose dust particles first come into contact, and partly to the suitable orientations of the sucrose molecules for the growth of crystals. The lower crystallizability of impure solutions is attributed firstly to the melassigenic effect of certain non-sugars which reduce the supersaturation of sucrose solution and secondly to the effects of the colloids which are adsorbed on the surfaces of crystals thereby retarding their growth, and which, moreover, act as protective colloids on the colloidal aggregates of sucrose molecules which are the precursors of crystal formation.

* * *

Lowering Purity of final Molasses.

I. Stammehaus (*Arch. Suikerind* 32, 1924) remarks that an important factor is the size and shape of the grain. This must be fairly small (about ·5 by ·7 mm.) uniform, hard, with sharp edges, and not round or needle shaped. He uses syrup alone for a pied-a-cuite, or, if this is over 87 purity, mixed with a run-off of at least 57 purity. Final massecuites of low purity and high brix can be purged at a higher temperature than those of high purity and low brix. The best average temperature for purging is 40° C. If water is used to dilute the massecuite, it is best to add it in several small portions. Massecuites of low purity give low-purity molasses only if their viscosity is not too high, as otherwise crystallization is interfered with. A table based on mutual control reports is presented showing that in practice there is no distinct relation between purity and brix of the final massecuite and final molasses. The brix of the massecuite must be at least 96, but nothing is gained by going up above 97, because then it becomes necessary to add water before purging, and this causes an increase in the purity of the final molasses.—(*Sugar*, 1926.)

MR. W. SCOTT, Professor of Sugar Technology, sailed for New York on 22nd July, and returned to Trinidad on 14th October. During his stay he investigated the technical and commercial developments of various by-products of cane-sugar, discussing in particular, the utilization of megass with officials of the Celotex Co. of New Orleans. Professor Scott met Dr. Coates of the Audubon Sugar School and visited its factory which was recently transferred from New Orleans to Baton Rouge. In New York, he met Noël Deerr with whom he discussed many points of mutual interest in sugar production. At the exhibition of Chemical Industries in New York, Professor Scott examined many exhibits of interest to the sugar industry.

REVIEWS.

MINISTRY OF AGRICULTURE AND FISHERIES.—Economic Series Nos. 2–13 and No. 15. His Majesty's Stationery Office.

In extension of Empire and domestic trade it is essential that Marketing should be done through the best channels and a necessary preliminary to suggestion is a survey of existing means. Studies of this nature were begun sometime ago by the Ministry of Agriculture and published in the Economic Series. The work was subsequently extended by the provision of a substantial and continuing grant by the Empire Marketing Board. The following studies have recently been received by the College :—

No. 2.—*Report of the Committee on Stabilisation of Agricultural Prices.* This covers the question of variation due to monetary causes and to changes of supply, and makes useful suggestions for stabilisation. Much depends of course on whether producers regard stability as desirable and if a wider stability is to be sought, the problem must be approached internationally.

No. 3.—*The Economic Resources of Canada in relation to British Food Supplies,* by Sir Henry Rew, K.C.B.

No. 4.—*Large Scale Co-operative Marketing in the United States.*

No. 5.—*The Co-operative Purchase of Agricultural Requisites.* (A survey of the present position in England and Wales.) This is a historical and descriptive study. In spite of its great value, co-operative work has not been universally successful. The present study shows that co-operative purchasing organisations have a high rate of mortality, and the following reflections are worth quoting: "Frequently societies have been launched without that careful preliminary survey of the trading field and of the capital and other equipment needed for its exploitation, which experience in ordinary business has shown to be essential. Similarly, new branches of activity have too frequently been undertaken without sufficient consideration and forethought. Hence, a cause of failure of many supply societies has been the premature development of a multiplicity of functions, notably on the marketing side, before the necessary financial strength and business experience has been acquired to enable the societies to carry increased trading responsibilities."

No. 6.—*Report on the Trade in Refrigerated Beef, Mutton and Lamb.*

No. 7—*Report on Wool Marketing in England and Wales.*

No. 8.—*Report on Agricultural Credit.* The connection of finance with farming is younger than its connection with industry. One of the difficulties is the need for longer period loans. This study considers the need for credit and the existing facilities, and gives recommendation for short term, co-operative, and long term credit.

No. 9.—*Report on the Marketing of Potatoes in England and Wales.*

No. 10.—*Report on Egg Marketing in England and Wales.*

No. 11.—*Report on the Marketing of Poultry in England and Wales.*

No. 12.—*Report on the Marketing of Pigs in England and Wales.*

No. 13.—*Report on Markets and Fairs in England and Wales.* (Part I, General Review.) Markets and Fairs, local, national, and international are closely bound up with the development of trade and have a fascinating history. A short note is devoted to this and rapid surveys are given of retail, wholesale produce and livestock markets also abattoirs, cold storage accommodation and hide and skin markets.

No. 15.—*Report on Fruit Marketing in England and Wales.* This was prepared with the object of providing home growers with a comprehensive view of the methods of marketing fruit, and enabling them more easily to consider what further steps can be taken by them to maintain their present position in the home market, and also, if possible, to increase their share of the total trade. The conclusion to be drawn from the report seems to be that the fruit industry generally has much to gain by adopting methods of marketing which will enable produce to be put on the market in a manner more in accordance with the requirements of wholesalers and retailers. Agreement on standard grades and packages is one method which can hardly fail to be beneficial to the industry. In this connection, collecting centres, where the produce of many growers can be brought together, graded, packed and sold under one management, appear to offer advantages. Another suggestion is the more extensive use of methods of storage and preservation. It is for the industry to consider what is possible and practicable in these and other directions.

G. W.

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FERTILISERS, THEIR SOURCES, MANUFACTURE AND USES.—Herbert Cave. Sir Isaac Pitman & Sons, Ltd., Pages 116, Illustrated. Price 3*s*.

This book is one of Pitman's Common Commodity Series, others of which have already been reviewed in these columns. It furnishes a simple description of the sources and modern modes of manufacture of the common phosphatic, nitrogenous and potassic fertilizer substances, in just sufficient detail to satisfy the requirements of the elementary agricultural student, and the planter or farmer who wishes to know more about familiar soil ameliorents. A useful final chapter deals with the valuation of fertilizers, with English law relating to the buying and selling of fertilizers, with British and foreign fertilizer legislation, and with trade associations in the United Kingdom. In an appendix, statistics are presented in tabular form, whence the rises and falls in fertilizer production and usage may be traced.

F. H.

POTATO VARIETIES, by R. N. Salaman, M.D., Cambridge University Press, 1926. Price 25s.

The author, Vice-President of the National Institute of Agricultural Botany, is well known by his work on the genetics of the potato, and recognized as a leading authority on that subject. His book is therefore, as might be expected, a useful and interesting summary of the scientific work which has been brought to bear within recent years upon the production of new varieties of that highly important crop.

For tropical agriculture the interest of the work lies in its exposition of methods and principles, for many of these are applicable with suitable modification to other crops, and there is no doubt that one of our most pressing needs at the present time is the acquisition along similar lines of extensive and intensive information about tropical crop-plants.

What Dr. Salaman writes about the application of genetics to variety raising, the classification of varieties, the genetic and environmental factors affecting yield, varietal differences in various respects, and their basis in chemical and anatomical characters, is all worthy of study by the plant-breeder, with whatever crop he may be working.

E. E. C.

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WHAT IS CO-OPERATION?—C. F. Strickland, pp. ii, 36 Lahore, *Civil and Military Press*, 1926.

This pamphlet is a reprint of various articles on co-operation addressed to soldiers. The language is simple and the treatment excellent, stress being given to the benefits accruing from the various methods of co-operative endeavour.

G. W.

BOOKS RECEIVED.

WE have to acknowledge the receipt of the following books:—

AGRICULTURE.

Forest Engineering and Extraction. J. F. Stewart. pp. 188, *Chapman & Hall*, 15s.

BOTANY.

Guide to the Royal Botanic Gardens Peradenyia. pp. 32, *Govt. Printer, Ceylon.*

CHEMISTRY AND TECHNOLOGY.

Power Alcohol. G. W. Monier Williams. pp. 324, *H. Froude & Hodder & Stroughton*, 21s.

The Chemical Elements. F. H. Loring. pp. 172, *Methuen & Co.*, 8s. 6d.

Textbook of Cellulose Chemistry. Emil Heuser. pp. 212, *McGraw Hill*, 12s. 6d.

Applied Physiology. Samson Wright. pp. 418, *Humphrey Milford.*

ECONOMICS.

Report by the Food Council on Wholesale Tea Prices. pp. 30, *H.M.S.O.*

1st Report of the Royal Commission on Food Prices. pp. 494, Vols. 1 and 2. *H.M.S.O.*

The Cotton World. J. A. Todd. pp. 268, *Pitman & Sons*, 5s.

Report on the Working of Co-operative Societies in the Central Provinces and Berar. pp. 34, *Govt. Press, Nagpur*, 2s. 6d.

Commercial Raw Materials. Chas. Toothaker. pp. 308, *Ginn & Co.*, 8s. 6d.

History of Economic Thought. L. H. Haney. pp. 678, *Macmillan*, 15s.

The New Colonial Policy. Helmer Key. pp. 214, *Methuen & Co.*, 7s. 6d.

Guide to Current Official Statistics, 1920. pp. 274, *H.M.S.O.* 1s.

Report of the Royal Commission on Indian Currency and Finance. pp. 144, *H.M.S.O.* 2s. 6d.

Memorandum on Labour Conditions in China. pp. 25, *H.M.S.O.*, 6d.

An Investigation of Certain Processes and Conditions on Farms. W. R. Dunlop. pp. 72, *National Institute of Industrial Psychology*, 2s.

1st, 2nd, 3rd and 4th Interim Reports of the Banking Commission, 1926. Department of Finance. pp. 132, *Stationery Office, Dublin*, 1s. 9d.

Cotton Growing in South Africa and the Rhodesias. J. S. Addison and H. C. Jeffreys. pp. 30, *Empire Cotton Growing Corporation*, 2s.

GENERAL.

Bibliographies Nos. 2, 3 and 4. pp. 170, *Royal Colonial Institute.*

Surveying as Practised by Civil Engineers and Surveyors. J. Whitlaw, Jnr. pp. 558. *Crosby Lockwood & Sons*, 16s.

Handbook of Ceylon, 1926. L. L. B. Turner. pp. 300, *Govt. Printer, Ceylon.*

MEDICINE.

Diet and Cancer. C. Monketon Copeman. pp. 34, *Ministry of Health.*

The Conduct of Medical Practice. pp. 332, *The Lancet*, 10s. 6d.

Nephritis. Herman Elwyn. pp. 348, *Macmillan & Co.*, 21s.

Incapacity or Disablement in its Medical Aspect. E. M. Brockbank. pp. 120, *H. K. Lewis & Co.*, 7s. 6d.

Recent Advances in Haematology. A. Piney. pp. 276, *J. & A. Churchill*, 12s. 6d.

Collected Papers, Vol. 3, 1926. International Board of Health. *Rockefeller Foundation.*

COLLEGE NEWS.

Sir William Himbury has been nominated by the Cotton Industry to a seat on the Governing Body for a further period of four years.

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Mr. T. H. Nicoll arrived in Trinidad to take a Post-Graduate course by the s.s. *Ingoma* on 30th October. Mr. Nicoll holds the degrees of M.A. (Hons.), B.Sc., of Glasgow University.

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The last item of College News for November should have read, "Mr. F. S. Thomson, one of the Deputy Managers of the Berbice Sugar Estates of Messrs. Davson & Co., in British Guiana, is taking a short course."

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Sir George E. Schuster, K.C.M.G., C.B.E., M.C., has been co-opted a Governor of the College and also a member of the Finance Committee. Sir George Schuster has, until recently, been Financial Secretary to the Sudan Government, and has recently been appointed Financial and Economic Adviser to the Colonial Office.

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The Hon. Carl de Verteuil, C.M.G., and Mr. G. C. Skinner have been co-opted Members of the Governing Body, and as they are resident in the Colony of Trinidad they become Members of the Advisory Committee. Mr. de Verteuil is the owner of well-known cacao estates and was formerly a member of the Legislative Council of Trinidad and Tobago. Mr. G. C. Skinner is the General Manager of the Usine Ste. Madeleine, which is the largest sugar factory in the British West Indies and controls a group of estates.

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Mr. J. W. Stephens, the well known merchant of Port-of-Spain who has been so generous to the College in the past, has again come forward with the gift of a large Victrola gramaphone and a number of records. He has presented this to the Students' Club which is being established in the upper storey of the new Dining Hall. The College authorities wish gratefully to acknowledge this generous gift, which should add to the amenities of the students' life in the College.

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Sir James Currie, K.B.E., C.M.G., has been appointed Chairman of the Governing Body of the Imperial College of Tropical Agriculture. Sir James Currie was born on 31st May, 1868. He was educated at Fettes College, Edinburgh, and at the Universities of that City and Oxford. For three years from 1911, he was a member of the Governor-General's Council for the Sudan and from 1900 to 1914 was Principal of the Gordon College at Khartoum, and Director of Education in the Sudan. From 1916 to 1918 he was Director of the Training Munition Workers Labour Supply Department, and from that date to 1921, held the post of Controller of the Industrial Training Department of the Ministry of Labour. Since 1922 he has been Director of the Empire Cotton Growing Corporation.

His appointment will be welcomed by all who have had the opportunity of personal or business relations with him, and who have, therefore experienced his tact, driving capacity and ability in affairs. The College is fortunate in being able to secure so noteworthy a successor to the late Sir Arthur Shipley.

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Memorial Services for Sir Arthur Shipley, Master of Christ's College, Cambridge, and Chairman of the Governing Body of the Imperial College of Tropical Agriculture, were held in Cambridge on the 28th September. The service in the College chapel was confined to the family mourners and members of the College, while a general service was held at the Church of St. Andrew the Great. Amongst those present at the latter, were the following representatives of the Imperial College of Tropical Agriculture: Lt.-Col. Sir David Prain and Dr. A. W. Hill, Members of the Governing Body, Mr. Algernon Aspinall, Secretary and Mr. C. Y. Shephard, Professor of Economics.

At the 48th meeting of the Governing Body held 21st October, 1927, on the motion of the Deputy Chairman—Sir David Prain—the Members of the Governing Body of the Imperial College of Tropical Agriculture, standing each in his place, expressed their sense of the irreparable public and personal loss sustained by the College, the Governors and the Staff through the untimely death of their eminent and esteemed Chairman, the late Sir Arthur Everett Shipley, and resolved that their expression of regard and grief be recorded in the Minutes and that a copy of the record be transmitted to members of the family of our lamented Chairman and to the authorities of the College of which he was the distinguished Master.

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A very pleasant excursion was made on Monday, 31st October, to the Usine Ste. Madeleine, at the kind invitation of Mr. Skinner, the General Manager, the occasion being the Company's Annual Live Stock Show. This Show is, we understand, still in process of development, and is organised by the Usine, to encourage the keeping of good working stock by the employees of the estate and the farmers who supply them with cane. For both parties, there were numerous classes in which to compete: bullocks, mules, donkeys and buffalos, in single or double carts, and horses, for which there were riding classes for the managers and assistant managers of the different estates. It was a splendid opportunity for seeing what the island produces in the way of working stock, for most of the prizes were competed for by animals which had worked all through the previous cane season. The standard all through was a high one, though the oxen were rather uneven: the buffalos were a particularly interesting group, as they represent a new departure which appears to be turning out most successful. The organisation all through was excellent, not only in the efficient way in which the classes were marshalled, judged and displayed—the printed programmes made it easy

to follow the competitors—but in the generous way in which refreshments were provided for the whole party. Most of us during the day took the opportunity of seeing a new dairy which is under construction, and some of the imported stock, which were afterwards paraded in the ring. We much appreciate the kindness which enables us to acquire information in such pleasant conditions, and were very sorry that Mr. Skinner was unfortunately prevented by illness from presiding. His place was ably taken by Mr. Torrance, to whom our warm thanks are due.

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At a meeting of the Academic Board held on the 20th September, the following students were awarded the associateship of the Imperial College of Tropical Agriculture :—

Mr. W. P. K. Findlay, B.Sc., A.R.C.S., D.I.C.
Mr. W. V. Harris, B.Sc.
Mr. D. MacDonald, B.Sc. (Agric.).
Mr. C. L. Newman, B.Sc. (Agric.).
Mr. J. E. Peat, B.Sc.
Mr. K. T. Hartley, B.Sc. (Oxon.).
Mr. H. B. Springer.
Mr. J. G. Davies.
Mr. H. K. Hewison.
Mr. J. E. Symond.
Mr. W. C. Lester-Smith, B.A., Dip. Agric. (Oxon.)
Mr. J. L. Moerdyk, B.Sc. (Agric.).
Mr. O. F. Olivier, B.Sc. (Agric.).
Mr. J. A. Craig, N.D.A., Dip. Agric. (Glasgow).
Mr. T. D. Rutter, B.Sc. (Lond.).
Mr. R. G. Heath, B.Sc. (Lond.).
Mr. H. Musk.
Mr. S. J. F. Dias.
Mr. P. A. Bowmaker, B.Sc. (Agric.).
Mr. D. W. H. Baker, B.Sc. (Agric.).
Mr. C. Harvey, B.Sc.
Mr. L. H. Stone, B.Sc.
Mr. T. L. Williams, B.A.

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Notifications have been received of the following appointments of students nominated by the Colonial Office, who were in attendance at the College last session :—

Mr. J. L. B. Kincaid, Superintendent of Agriculture, Nigeria.
Mr. K. T. Hartley, Agricultural Chemist, Nigeria.
Mr. A. de K. Frampton, Superintendent of Agriculture, Nigeria.
Mr. C. Harvey, District Agricultural Officer, Tanganyika Territory.
Mr. H. Musk, District Agricultural Officer, Tanganyika Territory.
Mr. J. A. Craig, Agricultural Field Officer, Federated Malay States.
Mr. R. G. Heath, Agricultural Field Officer, Federated Malay States.
Mr. W. V. Harris, Assistant Entomologist, Agricultural Department, Tanganyika Territory.
Mr. C. O. Oates, Assistant Agricultural Officer, Kenya.
Mr. E. F. Martin, Agricultural Officer, Uganda.
Mr. J. G. Reynard, Superintendent, Agricultural Department, Nigeria.
Mr. C. L. Newman, Agricultural Field Officer, Federated Malay States.

Notifications have also been received of the appointments of the following Empire Cotton Growing Corporation students :—

Mr. D. W. H. Baker, Agriculturist, Department of Agriculture, Sudan.
Mr. M. Greenwood, Government Chemist, Department of Agriculture, Nigeria.
Mr. L. T. Williams, after a couple of months' training at Kew, will proceed to the Gold Coast as an Economic Botanist attached to the Agricultural Department.

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR.—Preferential sugar fell from 16*s.* 6*d.* at the beginning of October to 15*s.* 4½*d.* in the middle of the month; rising later to 15*s.* 7½*d.* at which prices have stood to 15th November. Foreign 96° *c.i.f.* on the 14th November stood at 12*s.* 1½*d.*, a decline of 10½*d.* from the beginning of October. Quotations on 20th October were as follows: London Granulated 29*s.*; Imitation Yellows, 26*s.* 9*d.*; West Indian Crystallized, 29*s.* 6*d.* to 33*s.* with small sales reported; White Java, 27*s.* 6*d.*; Home Grown, 28*s.* 3*d.* to 28*s.* 9*d.* all duty paid.

COTTON.—Prices have shown no definite tendency, but the under-current has been bullish, although the market has been held in check by large selling. The Egyptian market has been steady. The Sudan sakel crop has for the most part passed into consumption.

CACAO.—Prices have been maintained for West African and West Indian. On 14th November the nominal quotation for Trinidad L.L.T. per cwt., was 80*s.* to 84*s.* has stood at that figure since September. Grenada 77*s.* to 78*s.* On 20th October small sales of Fine estate Trinidad were made at 85*s.*, but no business was reported in ordinary plantation which was valued at 80*s.* to 82*s.* Good plantation Trinidad to arrive was quoted at 72*s.* *c.i.f.* (with mark), and 69*s.* to 70*s.* (no mark). Sales were made in West African at 59*s.* 6*d.* *f.o.b.* for November to January.

TEA.—Averages on 19th October included, 23.83*d.* Darjeeling; 22.76*d.* Assam; 22.37*d.* Ceylon; 20.26*d.* Indian; 16.30*d.* Java; 16.26*d.* Sumatra. It is very rare for Java to average above Sumatra.

COPRA.—Sales outside chartings include Malabar at £29, Galle at £27 2*s.* 6*d.*, Mauritius at £27 7*s* 6*d.*, Java at £27 8*s.* 9*d.* and Zanzibar at £26 7*s.* 6*d.* per ton. Quotations for West Indian in London have shown a steady rise from £27 at the beginning of October to £27 17*s.* 6*d.* on 15th November, £28 being touched on certain days.

SUGAR: WITH SPECIAL REFERENCE TO THE WORK OF THE COLLEGE

The Imperial College of Tropical Agriculture.